Canadian Participation in the 1998 NATO/Poland Chemical Warfare Agent Sampling Demonstration

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DEFENCE RESEARCH ESTABLISHMENT SUFFIELD

Technical Report
DRES TR 1999-050

April 1999

Défense nationale National Defence

Canada

DEFENCE RESEARCH ESTABLISHMENT SUFFIELD
RALSTON ALBERTA

TECHNICAL REPORT 1999-050

CANADIAN PARTICIPATION IN THE 1998 NATO/POLAND CHEMICAL WARFARE AGENT SAMPLING DEMONSTRATION

by

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ABSTRACT

Between 1-3 September 1998, Canada participated in two NATO Sampling and Identification of Chemical Agents (SICA) demonstrations conducted at the Military Unit 2130, Warsaw, Poland. SICA teams from 9 NATO countries (BE, CA, FR, IT, NL, NO, SP, UK and US) as well as a team from Poland participated in the demonstrations. The first demonstration was conducted using a chemical warfare (CW) simulant, while the second demonstration was conducted with the CW agent, mustard.

The CW agent sampling demonstrations were valuable, not only from a scientific viewpoint, but also for raising the profile of SICA within the military. The sampling demonstrations afforded the NATO countries an opportunity to implement the lessons learned (i.e. team size, contamination control, chain of custody, etc) from the successful field trials held in France in 1997.

Within the NATO context, the major issue arising from the sampling demonstrations was the collection of samples as legal evidence. The prime reason for the sampling and identification of biological and chemical agents is to confirm use by the enemy and thereby support timely decisions concerning the NATO response to such actions. Subsequently, NATO may decide to turn the evidence of a CB attack over to the legal system. In such cases, the sampling and identification process must be able to stand up under legal examination. Alternatively, if this information is required solely for the use of the military, then the requirements may be somewhat less rigorous. The authors recommend that the Sampling and Identification of Biological and Chemical agents (SIBCA) subgroup seek the guidance of LG/7 and SHAPE in determining the military requirements in this area.

Canada needs to address how the SIBCA process can be implemented with the Canadian Forces (CF). The CF needs to formulate a Concept of Use document that describes the overall framework within which SIBCA, and ultimately radiological sampling and identification (SIBCRA), can be developed within the Canadian Forces.

KEYWORDS: NATO
SICA
SIBCA
Chemical Warfare Agents
Sampling

ACKNOWLEDGMENTS

The authors wish to thank Mr. A. Strange, Mr. J. Jacob, Mr. K. Lutter and Mrs. D. Hicken for their assistance in preparing the Canadian sampling team for the NATO/Poland chemical warfare agent sampling demonstration. In addition, the authors wish to thank Col. A. Strynadka and Sgt. K. Toomer of the Canadian Embassy in Warsaw, Poland for their assistance while the Canadian sampling team was in Poland.

Executive Summary

Title: J.R. Hancock, Capt. R. Tremblay, Sgt. D. Marshall and LCdr. J.G. Nadeau, Canadian Participation in the 1998 NATO/Poland Chemical Warfare Agent Sampling Demonstration, Technical Report No. 1999-050, April 1999, UNCLASSIFIED.

Introduction: The Canadian Forces (CF) may be called on to conduct peacekeeping or peacemaking operations in regions of the world where there is a significant threat of chemical/biological warfare agent use. To operate effectively in these theatres the CF must be able to identify the exact nature of the chemical/biological agent(s). As part of NATO, Canada may be required to collect, package, transport and analyze samples believed to contain chemical or biological warfare agents.

Results: Between 1-3 September 1998, Canada participated in two NATO Sampling and Identification of Chemical Agents (SICA) demonstrations conducted at the Military Unit 2130, Warsaw, Poland. SICA teams from 9 NATO countries (BE, CA, FR, IT, NL, NO, SP, UK and US) as well as a team from Poland participated in the demonstrations. The first demonstration was conducted using a simulant, while the second demonstration was conducted with the CW agent mustard.

The CW agent sampling demonstrations were valuable, not only from a scientific viewpoint, but also for raising the profile of SICA within the military. The sampling demonstrations afforded the NATO countries an opportunity to implement the lessons learned (i.e. team size, contamination control, chain of custody, etc) from the successful field trials held in France in 1997.

Significance of Results: The CF may be deployed in regions of the world where there is a significant threat of chemical/biological warfare agent use. Identification of agents is of importance since the results of such analyses would contribute to the development of strategic and political positions regarding future Canadian military operations and would facilitate the dissemination of technical advice to in-theatre field commanders and medical personnel.

Future Goals: Canada needs to address the mandate of Sampling and Identification of Biological and Chemical Agents (SIBCA) and how this process can be implemented with the Canadian Forces. There is a requirement for National Defence Headquarters to formulate a Concept of Use document that describes the overall framework within which SIBCA and mostly likely radiological sampling and identification (SIBCRA) can be developed within the Canadian Forces. The CB threat spectrum includes chemical and biological warfare agents and toxins of biological origin in the "mid-spectrum" between these agents. The CF needs the ability to collect, transport and identify all agents in the threat spectrum. DRES will initiate an effort to integrate the disparate requirements for these agents into a single sample collection and transport system.

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INTRODUCTION

NATO may be called upon to deploy military forces in support of peacekeeping or battlefield operations in regions of the world where there is a significant threat of chemical/biological warfare (CBW) agent use. Under the umbrella of the NATO Army Armaments Group, Land Group 7 (LG/7) on NBC Defence established a subgroup of experts to deal with the problems associated with the Sampling and Identification of Biological and Chemical Agents (SIBCA). This subgroup produced Allied Engineering Publication 10 (AEP-10), which describes procedures and techniques for sample collection, packaging, transport and identification of samples believed to contain chemical warfare agents (1).

According to AEP-10, the prime reason for the rapid identification of chemical warfare agents in a battlefield environment is to confirm enemy use, and to support timely decisions concerning the NATO response to such use. NATO doctrine states that there must be consensus of all nations before the Alliance can respond to the use of CBW agents against NATO troops. Consensus can only be reached if all the evidence of CBW agent use clearly supports the allegation.

Between 9-11 September 1997, NATO conducted two Sampling and Identification of Chemical Agents (SICA) field trials at the Centre d'Études du Bouchet (CEB) at Vert-le-Petit, France. The objective of these trials was to assess, through the use of CW simulants, the validity of the AEP-10 procedures. The performance of each of the sampling teams was assessed by umpires using criteria developed from the relevant NATO standardization agreements (STANAGs) (2-6). Following the trial, NATO published the SIBCA chairman's report to LG/7, which concluded that all the participating nations had fully competent and effective SICA sampling capabilities (7). The NATO SICA report concluded that while the field trials had validated the guidance provided in AEP-10 there were a number of issues that should be clarified or revised. At the 1998 SIBCA meeting, Canada and Norway presented reports on their countries' participation and recommendations from these trials (8,9).

During the second NATO SICA/Partnership for Peace Workshop in May 1996, Poland formally offered to host a SICA demonstration. The offer was accepted the following year and was scheduled to take place as a follow-up to the SICA field trials at CEB. Between 1-3 September 1998, two SICA demonstrations were conducted at the Military Unit 2130, located just outside of Warsaw, Poland. SICA teams from 9 NATO countries (BE, CA, FR, IT, NL, NO, SP, UK and US) as well as a team from Poland participated in the demonstrations. Additional representatives from Denmark, Germany and Poland participated as umpires and representatives from Sweden, Hungary and Finland were in attendance as observers. The first demonstration was conducted using a CW simulant, while the second demonstration was conducted with the CW agent, mustard. This report describes Canada's preparation, participation and recommendations from these demonstrations.

PREPARATIONS FOR THE NATO/POLAND CHEMICAL WARFARE AGENT SAMPLING DEMONSTRATIONS

The Canadian team which participated in the NATO/Poland SICA demonstrations was comprised of Mr. J.R. Hancock (Canadian representative on SIBCA), Capt. R. Tremblay (Science Officer) both from the Defence Research Establishment Suffield, Ralston, Alberta, Sgt. D. Marshall (NBC Instructor) from the Canadian Forces NBC School, Borden, Ontario and LCdr. J.G. Nadeau (DNBCD 2-2) from National Defence Headquarters, Ottawa, Ontario.

As the chemical warfare agent sampling demonstrations included all elements of a sampling mission, it was necessary for the team to be self-sufficient while operating in the field. In addition, with the requirement for Canada to ship their equipment to Poland, it was decided that the transport containers used for shipping would also serve for organizing the equipment during the demonstrations. In total, eight transport containers were shipped (four containing sampling and related equipment, four containing NBC clothing). Annex I contains the inventory list for each of the transport containers.

As a result of the experience gained during the field trials in France in 1997, a number of changes were made to the sampling team, their equipment and procedures. The size of the team was increased from three to four persons, with the fourth person being responsible for recording both photographic and factual information during the sampling mission as well as handling radio communications between the sampling site and the decontamination (decon) line. Video recording was replaced with still photography using disposable cameras that could be shipped with the samples. Audible alarms were added to the chemical agent monitors (CAMs) in order to provide the sampling team with an early warning when working a short distance from the CAM.

In the planning stages prior to the field trials, it was decided that a SICA sampling mission could be broken down into six phases. These phases were:

a) Pre-deployment;
b) Arrival on site;
c) Sample collection;
d) Exiting the contaminated site;
e) NBC messages; and
f) Sample packaging.

In the text which follows, information is provided on the procedures used during each phase of the sampling demonstrations as well as the responsibilities of each member of the sampling team. Based on their responsibilities, the team members were designated as:

a) "dirty" man (the team member responsible for the actual sample collection and the team member most likely to become chemically contaminated);
b) "clean" man (the team member who assists the dirty man, but should, in principle, not become contaminated);
c) "recorder" (the team member who records photographic and factual sampling information); and

d) "decon" man (the team member responsible for the decontamination of the sampling team, samples and their equipment as they exit the contaminated site).

Aide-memoires outlining the responsibilities of each team member were reproduced on 11 x 20 cm laminated sheets and were carried in the leg pocket of the CF NBC suit. These checklists were used during each phase of the sampling mission and were especially useful during pre-deployment and arrival on-site.

In preparation for the chemical warfare agent sampling demonstrations, the equipment and procedures described below were tested during August 1998 on the DRES Experimental Proving Ground. The main focus of these tests was to refine procedures and equipment to be used during the demonstrations.

PHASE 1: PRE-DEPLOYMENT

The pre-deployment phase involves the entire team checking that the correct sampling and NBC protective equipment is available and in operating condition prior to proceeding to the contaminated site. All members of the sampling team, in addition to being responsible for their own personal equipment, have specific responsibilities during the entire mission.

Upon being informed that sampling team is to be ready to be deployed on a sampling mission, the **clean** man:

a) completes inventory of transport container #1 which holds the sampling kits and global positioning system (GPS). A detailed inventory list is found in each transport container;
b) confirms operation of GPS by obtaining GPS fix on pr- -deployment area;
c) assists other sampling team members as necessary;
d) dons NBC Individual Protective Ensemble (TOPP Medium) prior to leaving pre-deployment area; and
e) completes PERSONAL EQUIPMENT CHECKLIST prior to leaving pre-deployment site.

PRE-DEPLOYMENT (CLEAN MAN)
PERSONAL EQUIPMENT CHECKLIST

CB Overboots
CB Suit
Inner Latex Gloves
Outer CB Gloves
Respirator and Carrier
- One Diazepam Autoinjector
- Three HI-6 Autoinjectors
- Spare Outer CB Gloves
- 3-Way Detector Paper
- RSDL
- NAVD

Radio

Upon being informed that sampling team is to be ready to be deployed on a sampling mission, the **dirty** man:

a) completes inventory of transport container #2 which holds the chemical agent monitors (detailed inventory list is found in each transport container);
b) powers-up all CAMs, installs inlet filters, CAM buzzers and leaves all CAMs operating while in pre-deployment site;
c) checks each CAM and CAM buzzer response in both modes with confidence tester. Retains one confidence tester;
d) keeps two CAMs with him at all times. Returns other two operating CAMs in transport container while enroute to contaminated site;
e) assists other sampling team members as necessary;
f) dons NBC Individual Protective Ensemble (TOPP Medium) prior to leaving pre-deployment area; and
g) completes PERSONAL EQUIPMENT CHECKLIST prior to leaving pre-deployment site.

PRE-DEPLOYMENT (DIRTY MAN)
PERSONAL EQUIPMENT CHECKLIST

CB Overboots
CB Suit
Inner Latex Gloves
Outer CB Gloves
Respirator and Carrier
- One Diazepam Autoinjector
- Three HI-6 Autoinjectors
- Spare Outer CB Gloves
- 3-Way Detector Paper
- RSDL
- NAVD
- One CAM Confidence Tester

Radio
Two CAMs

Upon being informed that sampling team is to be ready to be deployed on a sampling mission, the **decon** man:

a) completes inventory of transport container #3 which holds the decontamination kit (detailed inventory list is found in each transport container);
b) assists other sampling team members as necessary;
c) dons NBC Individual Protective Ensemble (TOPP Medium) prior to leaving pre-deployment area; and
d) completes PERSONAL EQUIPMENT CHECKLIST prior to leaving pre-deployment site.

PRE-DEPLOYMENT (DECON MAN)
PERSONAL EQUIPMENT CHECKLIST

CB Overboots
CB Suit
Inner Latex Gloves
Outer CB Gloves
Respirator and Carrier
- One Diazepam Autoinjector
- Three HI-6 Autoinjectors
- Spare Outer CB Gloves
- 3-Way Detector Paper
- RSDL
- NAVD

Radio
Notepad and Pencil

Upon being informed that sampling team is to be ready to be deployed on a sampling mission, the **recorder**:

a) completes inventory of transport container #4 which holds the packaging kit (detailed inventory list is found in each transport container);
b) issues radios to each sampling team member and performs radio check;
c) assists other sampling team members as necessary;
d) dons NBC Individual Protective Ensemble (TOPP Medium) prior to leaving pre-deployment area; and
e) completes PERSONAL EQUIPMENT CHECKLIST prior to leaving pre-deployment site.

PRE-DEPLOYMENT (RECORDER)
PERSONAL EQUIPMENT CHECKLIST

CB Overboots
CB Suit
Inner Latex Gloves
Outer CB Gloves
Respirator and Carrier
- One Diazepam Autoinjector
- Three HI-6 Autoinjectors
- Spare Outer CB Gloves
- 3-Way Detector Paper
- RSDL
- NAVD

Radio
Notepad and Pencil

PHASE 2: ARRIVAL ON-SITE

When the sampling team arrives on site they immediately check the wind direction (UPWIND) and begin to deploy the contents of the various transport containers. If not already present, a liquid/vapour hazard area and a clean/dirty line are established. The team uses this area to assemble their decontamination equipment, obtain a GPS fix and moves to TOPP HIGH prior to entering the contaminated site.

Upon arriving at the sampling site, the **clean** man:

a) conducts a visual inventory of transport containers;
   Transport container #1 - Sampling Kits and GPS
   Transport container #2 - Chemical Agent Monitors
   Transport container #3 - Decontamination Kit
   Transport container #4 - Packaging Kit
b) removes the GPS from Container #1 and obtains a GPS fix;
c) assists the dirty man in establishing borders of liquid/vapour hazard area;
d) places sampling kits at the far end of the liquid/vapour hazard area;
e) assists other sampling team members as required;
f) places 3-way detector paper on IPE. Collects CAM and marker flags;
g) moves to TOPP HIGH and performs mask check; and
h) moves to clean/dirty line for final PERSONAL EQUIPMENT check.

ARRIVAL ON-SITE (CLEAN MAN) PERSONAL EQUIPMENT CHECKLIST
Full IPE TOPP HIGH
Respirator Carrier
One Diazepam Autoinjector
Three HI-6 Autoinjectors
Spare Outer CB Gloves
3-Way Detector paper
RSDL
NAVD
Sampling kits (Vapour and Liquid Modules)
One Spare CAM Battery
One CAM
Radio
5 marker flags

Upon arriving at the sampling site, the **dirty** man:

a) checks wind direction, ensuring that team is upwind of the contaminated site;
b) positions 2 CAMs to monitor for CW agents;
c) if not already present, establishes borders of liquid/vapour hazard area;
d) assists other sampling team members as required;
e) places 3 way detector paper on IPE. Collects CAM and marker flags; and
f) moves to clean/dirty line for final PERSONAL EQUIPMENT check.

ARRIVAL ON-SITE (DIRTY MAN)
PERSONAL EQUIPMENT CHECKLIST

Full IPE TOP HIGH
Respirator Carrier
- One Diazepam Autoinjector
- Three HI-6 Autoinjectors
- Spare Outer CB Gloves
- 3-Way Detector paper
- RSDL
- NAVD

One Spare CAM Battery
One CAM
One CAM Confidence Tester
Radio
5 marker flags

Upon arriving at the sampling site, the **decon** man:

a) unpacks transport container #3 containing decontamination kit;
b) places boot tray approx. 5 meters on dirty side of clean/dirty line;
c) places second large tray approx.0.5m in front of boot tray;
d) places sample decontamination tray and sponge just on dirty side of clean/dirty line;
e) places sample tray on clean side of clean/dirty line;
f) places transport container on clean dirty line;
g) prepares decontaminant by adding contents of one bleach container (1 kg) into decon Jerry can (20 L) and filling with water;
h) fills boot tray with decontaminant;
i) fills sample decontamination tray with decontaminant;
j) prepares second batch of decontaminant by adding contents of one bleach container (1 kg) into decon Jerry can (20 L) and filling with water;
k) assembles, charges and tests sprayer;
l) assists other sampling team members as required; and
m) moves to TOPP HIGH and once all remaining team members are in TOPP HIGH establishes clean/dirty line.

ARRIVAL ON-SITE (DECON MAN) PERSONAL EQUIPMENT CHECKLIST
Full IPE TOPP HIGH
Respirator Carrier
One Diazepam Autoinjector
Three HI-6 Autoinjectors
Spare Outer CB Gloves
3-Way Detector paper
RSDL
NAVD
Radio
Notebook
Pencil

Upon arriving at the sampling site, the **recorder**:

a) opens transport container #4 and sets up packaging and reporting station;
b) assists other sampling team members as required;
c) places 3-way detector paper on IPE;
d) moves to TOPP HIGH and performs mask check; and
e) moves to clean/dirty line for final PERSONAL EQUIPMENT check.

ARRIVAL ON-SITE (RECORDER) PERSONAL EQUIPMENT CHECKLIST
Full IPE TOPP HIGH
Respirator Carrier
One Diazepam Autoinjector
Three HI-6 Autoinjectors
Spare Outer CB Gloves
3-Way Detector paper
RSDL
NAVD
Radio
Disposable Camera
Notebook
Pencil

PHASE 3: SAMPLE COLLECTION

Following a CW attack there will be physical evidence of the attack (unexploded munitions, munition fragments, craters, etc.). An initial visual survey conducted by walking the contaminated site should reveal potential sampling locations. If after an initial visual survey no contaminated sites were marked, a detailed survey using CAM is to be carried out.

Upon entering the contaminated site the **clean** man:

a) moves, with the dirty man, to farthest downwind location in contaminated site. Starting on the same side of the site, approximately 10 meters apart, both team members conduct a visual site survey by moving across the site in a "S" pattern which takes them upwind towards the clean/dirty line;
b) marks, with a marker flag, any potentially contaminated location. The CAM is used to check for contamination, but in order to minimize possible contamination to the sampling team, detailed examination of a location is done only after the entire site has been surveyed;
c) if a contaminated site(s) is found during the survey, radios decon man , who prepares hazard warning sign;
d) once the site survey is completed, leaves his CAM at the edge of the liquid/vapour hazard area, retrieves sampling kits and proceeds to the contaminated location farthest downwind;
e) removes the ground sheet from the exterior pocket of the sampling kit and places it on the ground anchoring the corners with the spikes provided;
f) provides dirty man with required sampling equipment;
g) holds polyethylene bag open, so that dirty man can place the sample in the bag and seal the bag upon completion. Sealed bags are then stored in the ammo pouch found in the sampling kit;
h) moves to next contaminated location upwind of current location for further sampling; and
i) once all contaminated locations have been checked, proceeds to the clean/dirty line with sampling kit and samples.

Upon entering the contaminated site the **dirty** man:

a) moves, with the clean man, to farthest downwind location in contaminated site. Starting on the same side of the site, approximately 10 meters apart, both team members conduct a visual site survey by moving across the site in a "S" pattern upwind towards the clean/dirty line;
b) marks, with a marker flag, any potentially contaminated location. The CAM is used to check for contamination, but in order to minimize possible contamination to the sampling team, detailed examination of a location is done only after the entire site has been surveyed;
c) once the site survey is completed, proceeds to the contaminated location farthest downwind;
d) in conjunction with clean man, decides on the type of sample to be collected, based on the on the following priorities; 1) liquid from an intact munition, 2) munition fragment and 3) environmental sample;

e) if possible, collects background samples prior to collecting contaminated samples;
f) surveys possible samples with 3 way detector paper;
g) informs clean man of what sampling equipment is required to collect the sample;
h) collects sample(s), places the sample in a polyethylene bag held by the clean man;
i) moves to next contaminated location upwind of current location; and
j) once all contaminated locations have been checked, moves to clean/dirty line.

Upon entering the contaminated site the **recorder**:

a) waits in the liquid/hazard area until the clean and dirty men to complete the site survey;
b) proceeds with the clean and dirty men to the contaminated location farthest downwind;
c) records in notebook, sampling information (e.g. site number, type of sample collected, CAM response etc.);
d) radios decon man with sample information, location and if possible provisional agent identification;
e) photographs and sketches the sampling site;
f) moves to next contaminated location upwind of current location; and
g) once all contaminated locations have been checked, radios decon man that the sampling team is moving to the clean/dirty line.

When the recorder, clean, and dirty men enter the contaminated area, the **decon** man;

a) maintains radio contact with the sampling team;
b) once the team has confirmed the presence of a chemical agent, places the "GAS" hazard warning sign approximately 2 meters past the decontamination boot tray;
c) generates and transmits by radio the NBC-4 message (and subsequently a hard copy);
d) ensures drinking water is available at clean/dirty line for returning team members; and
e) upon radio confirmation that team is returning, prepares to decontaminate sampling team members.

PHASE 4: DECONTAMINATION (EXITING CONTAMINATED SITE)

In order to minimize the danger of spreading chemical warfare agents outside of the contaminated site, it is mandatory to decontaminate the sampling team members and their equipment/samples prior to their exiting the site. Decontamination is carried out in the liquid/vapour hazard area, within 10 meters of a pre-established clean/dirty line. The CF Sub-Unit Level 20 Liter Decontamination Apparatus (NSN 4230-21-906-0399) is used for dispensing the decontaminant.The decontaminant used in these field trials was one kilogram of dichloroisocyanuric acid sodium salt dihydrate (Fichlor) dissolved in 20 liters of water.

Each sampling team member is decontaminated by the decon man who:

a) directs team member to step into a boot tray of decontaminant, immerse his boots, then to move forward towards the clean/dirty line;
b) directs team member to place items such as, the sampling kit or CAMs beside the tray;
c) sprays team member's gloves with decontaminant;
d) directs team member to remove small items such as autoinjectors and radios from pockets on IPE and place them in the tray;
e) directs team member to remove respirator carrier and place it beside tray; and
f) sprays team member's hands again and then sprays team member from head to foot, front and back after which team member is directed to move towards clean/dirty line.

Each sampling team member is undressed by the decon man who:

a) removes outer CB glove, by grasping glove at cuff and peeling glove off hand leaving inner latex glove in place. Undoes Velcro fastener at the wrist and rolls up cuff (roughly one inch) and repeats for other glove;
b) undoes Velcro fastener around hood and down the front of CB suit;
c) pulls down zipper from hood and front of CB suit and pulls flap from hood back over left shoulder of CB suit; and
d) directs team member to turn around, lifts hood over back of head, peels the suit from one shoulder and arm (repeats for other shoulder) and pulls CB suit down below knee level.

The team member being undressed then steps forward, turns and sits, facing into the contaminated site, on a bench (transport container #3), located on the clean/dirty line. The decon man then:

a) undoes Velcro fasteners at ankle, rolls up trouser leg (roughly one inch) and undoes elastic fasteners on CB overboot; and
b) removes CB overboot while sliding trouser off leg. Simultaneously the team member being undressed swings one leg over to the clean side of clean/dirty line (repeat for other leg).

The undressed team member stands, steps into the clean area and removes CB mask and inner latex gloves.

Once the sampling team members have been decontaminated and undressed, the decon man proceeds to decontaminate items such as; samples, sampling kits, CAMs, etc., in the following manner:

a) sprays gloves with bleach;
b) using sponge and decontaminant tray, wipes outside of sample bags with bleach;
c) places cleaned samples in tray on clean side of clean dirty; and
d) repeats procedure for remaining items (CAM, radios, autoinjectors).

On completion, the decon man undresses himself by following the same procedures with the exception that only the CB overboots and gloves need to be decontaminated.

PHASE 5: NBC MESSAGES

Following a chemical warfare agent attack, NBC Messages are sent within the CF command structure to report this event to higher commands and to warn local units in the field. The format and content of these messages are outlined in NATO ATP-45 (STANAG 2103) (10). Upon observing an attack, a NBC-1 message is sent to the NBC sub-collection center. SICA sampling teams may then be deployed as a result of these NBC messages. Once the SICA sampling team has conducted their survey and sampling of a suspected contaminated site, they in turn generate an NBC-4 message which is sent to the NBC sub-collection center.

The decon man is responsible for generating and transmitting NBC-4 messages during the sampling mission. This message contains three parts, "Hotel (H)", "Quebec (Q)" and "Sierra (S)". The decon man:

a) completes line "Hotel" on the NBC-4 message form indicating the type of agent detected;
b) completes line "Quebec" indicating location of sampling and type of sample collected. In addition, this line is used to indicate a SICA sample was taken;
c) completes line "Sierra" indicating date-time group (Zulu) when samples were collected;
d) repeats lines "Hotel", "Quebec" and "Sierra" as often as necessary; and
e) transmits NBC-4 message to NBC Sub Collection Centre.

PHASE 6: SAMPLE PACKAGING

Once samples have been collected in the field it is important to transport them to a field or national laboratory as quickly as possible. It is the responsibility of these laboratories to provide rapid unambiguous identification of the chemical warfare agents. The most rapid means of transport is by air. Chemical warfare agents, due to their toxicity, are classified by the International Air Transport Association (IATA) as dangerous goods (Class 6 Division 6.1) and are forbidden to be transported on commercial aircraft. In Canada, the transportation of dangerous goods on CF aircraft is governed by regulations found in CF publication A-LM-117-001/FP-001 (11). Under normal conditions, the CF follows IATA regulations for the transportation of dangerous goods. NATO STANAG 3854 recognizes that there are situations where dangerous goods will have to be moved despite IATA regulations. It provides guidelines for nations to develop national regulations for the transportation of dangerous goods under these conditions (12). The packaging system described below meets the requirements for Class 6 Division 6.1.

The packaging and labeling of the samples is the responsibility of the clean and dirty men. After going through the decontamination procedure they don new respirators and gloves and retrieve the samples (following their decontamination) from the clean side of the clean/dirty line. The men then:

a) retrieve one dangerous goods packaging box from the transport container. This unit contains all the packaging and labels for proper packaging of the samples. It consists of an outer packaging (the box), an inner packaging (plastic container) and associated packaging materials;

b) remove and retain the foam lid, and remove the inner plastic container;
c) in order to minimize movement during transport, each small samples may be wrapped in bubble pack. The inner packaging has an insert which divides the inside into four compartments and permits it tocarry up to four individual samples (one in each of the four compartments). Large samples such as munition fragments can be packed into this container by removing the dividing insert, wrapping the sample in bubble pack and placing the sample in the container;
d) close the lid of the inner packaging, ensuring that there is a rubber o-ring on the outside of the container;
e) secure the inner packaging with security tape around the outside of the lid, ensuring that the tape goes completely around the outside of the lid and overlaps the lid and body of the inner packaging;
f) remove the labels from the outer packaging;
g) insert the inner packaging into the cardboard ring in the outer packaging;
h) tie the top of the plastic bag together with the tie provided;
i) place foam lid on top of inner packaging;
j) affix toxic hazard label (in diamond orientation) on side of the outer packaging. DO NOT COVER any existing markings on outer packaging with hazard label;
k) affix "UN 2810 Toxic liquid, organic" and "UN 3243 Solids containing toxic liquid" label to outside of the outer packaging beside the toxic hazard label;
l) affix address label to outside of outer packaging (DO NOT COVER any existing markings on the outer packaging);
m) complete the Sample Data Sheet and place the top copy inside outer packaging. Close the lid of the outer packaging and secure lid with packaging tape. Retain second copy of Sample Data Sheet; and
n) transfer package to shipper for forwarding to laboratory for analysis.

SHIPMENT OF TRANSPORT CONTAINERS TO POLAND

At the end of July 1998, the transport containers, containing sampling equipment and NBC clothing, were handed over to the DRES Material Control Group for shipment to the Polish Military Institute of Chemistry and Radiometry. The shipment contained two dangerous goods; dichloromethane (toxic substance) used in the sampling kits and lithium batteries (miscellaneous dangerous goods) which are used in the CAM. Both items were packaged in accordance with the transportation of dangerous goods regulations. In addition the shipment also contained four CAMs which employ a radioactive ^{63}Ni source. These items, which did not constitute dangerous goods were identified as "UN2910 Radioactive material, excepted package, instruments".

Delays had been encountered with the customs clearance of these same transport containers when they were shipped to the field trials in France in 1997 (8). Although the shipment arrived in time for the field trials, one of the subsequent recommendations was that DRES should explore alternate shipping solutions.

Poland had indicated that they would be able to facilitate the clearance through customs for those sampling teams traveling with their equipment, however those shipping their equipment in advance of their team (as was the case for Canada) could encounter problems with customs clearance. DRES contacted the Canadian Forces attaché at the Canadian Embassy in Warsaw, Poland and it was his recommendation that the transport containers be shipped by diplomatic mail.

With the cooperation of the diplomatic mail services of the Department of Foreign Affairs Industry and Trade, DRES shipped the transport containers to Ottawa by ground.The diplomatic mail services then coordinated the shipment from Ottawa to the Canadian Embassy in Warsaw. The advantage of this method was that the transport containers bypassed Polish Customs and were delivered directly to the Canadian Embassy.

Once the Canadian sampling team arrived in Warsaw, Polish officials arranged to collect the transport containers from the Canadian Embassy and deliver them to the demonstration site. Following the demonstrations, the transport containers were returned to the Canadian Embassy and shipped back to Canada by the diplomatic mail route. This system worked well for this type of demonstration and should be considered for future operations.

CW SAMPLING DEMONSTRATION PARTICIPATION

On September 2nd and 3rd, 1998, two NATO SICA chemical warfare agent sampling demonstrations were conducted at Military Unit 2130 (MU2130), located outside of Warsaw, Poland. The first demonstration was conducted using a CW simulant, while the second demonstration was conducted with the CW agent, mustard. The performance of each of the sampling teams was assessed by umpires using criteria developed from the relevant NATO STANAGs (2-6) and listed at Annex II.

Figure 1 illustrates the schematically the sampling layout used for both sampling demonstrations. Tents were provided to each national sampling team in which they stored their equipment and protective clothing. Medical facilities and personnel were present on the outer perimeter of the sampling layout. Prior to entering the layout all personnel were required to undergo a gas mask check at a facility provided by Poland. A single entry point was used by all SICA teams at the Polish decon line. When entering the layout, Polish personnel checked that all SICA teams were in TOPP HIGH. Once on the layout, each country moved to their pre-assigned lane in which to carry out the sampling mission. In each lane along with the sampling team and umpires, there was a Polish safety officer who controlled entry and exit from the lane and who had the responsibility to ensure that any operation conducted in his lane was done safely. The beginning of the lane was used to demarcate the contaminated and clean areas. Due to restrictions in the total space available for the trial and the large number of SICA teams, each team was assigned an area of approximately 10 meters by 50 meters.

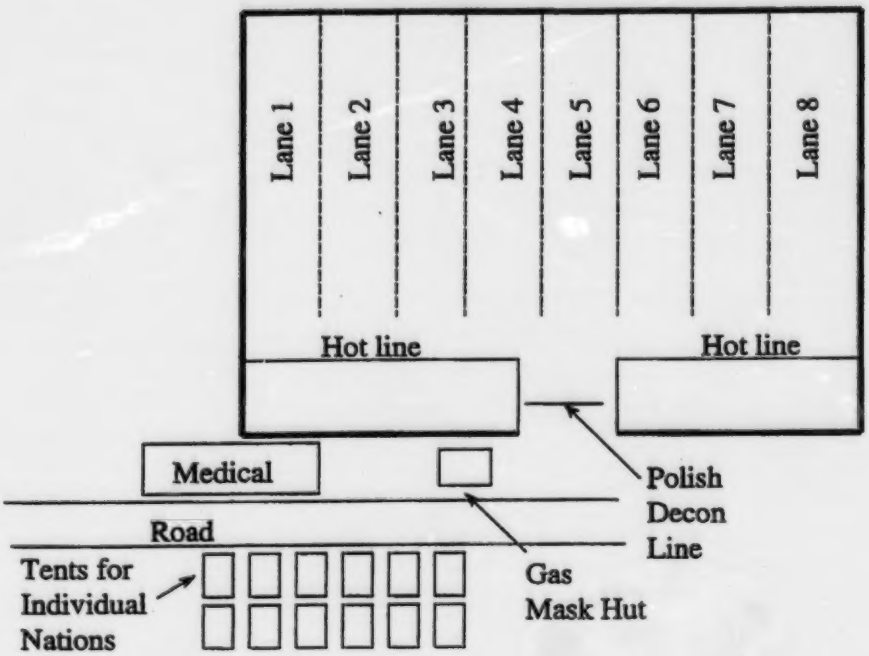


Figure 1. Representative schemtic (not to scale) of sampling layout and staging area used on both CW agent sampling demonstrations.

CW SAMPLING DEMONSTRATION #1

On the morning of September 2nd, 1998, the SICA sampling teams from Poland and the participating NATO countries assembled at MU 2130 and were given an operational briefing which described the following situation:

- Following a period of tension between the states of NATO and a hostile nation equipped with chemical weapons, NATO forces are positioned tactically, prepared for intervention if requested by the United Nations.
- The hostile nation reacts to NATO deployment with a chemical strike on a rear command post. Detectors indicated the use of a blister type chemical warfare agent.
- The contaminated area has not been surveyed.
- The Commander of the NATO CJTF has ordered a NATO SICA team to the area to take samples in the contaminated area and to transport them to the nearest NATO laboratory for analysis.

The sampling teams were then instructed to proceed to their tents and prepare for a SICA mission. Normally, at this point the CA sampling team would move to TOPP MEDIUM and would carry the transport containers to a clean area upwind of the contaminated site, where they would establish the liquid/vapour hazard area. Figure 2 illustrates this area with the position of the decon equipment. In Poland, prior to entering the sampling layout, each team was required to be in TOPP HIGH and undergo a gas mask check using a testing facility provided by Poland. For this reason, before the start of the demonstration, each team was allowed "administrative time" during which they could pre-deploy their equipment.

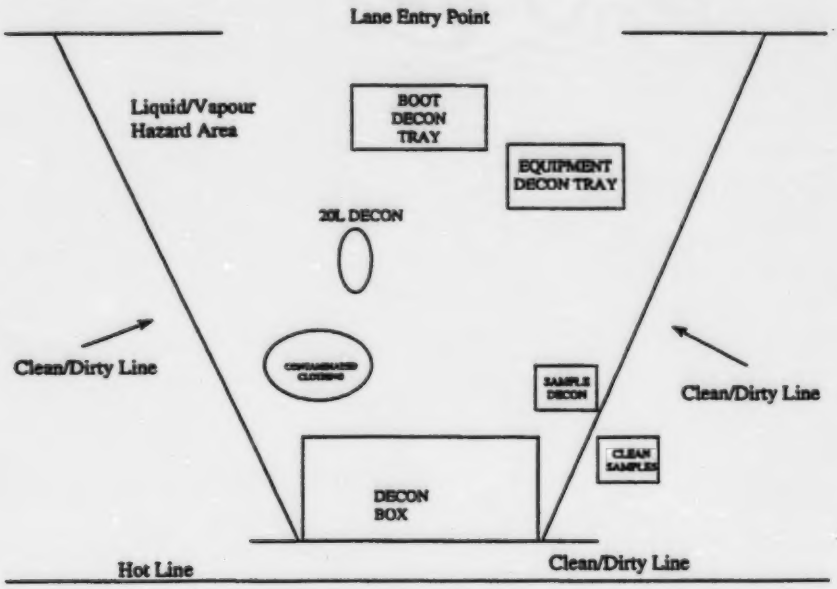


Figure 2. Schematic (not to scale) of Liquid/Vapour Hazard Area showing the location of the decontamination equipment, clean/dirty line and the entry point into the sampling lane.

Prior to proceeding to the sampling layout, umpires were assigned to each team (UK and PO umpires were assigned to the CA team), and using the checklist shown in Annex II, they inspected the equipment used by each SICA team. The CA sampling team and their umpires then proceeded to the gas mask check area and once cleared by the Polish safety personnel, moved to their lane on the sampling layout. Each team member then initiated the procedures outlined in the "Arrival On Site" checklist. As the final step in this phase, the decon man then established the clean/dirty line. The team then collected representative soil,

vapour and water control samples before proceeding into the sampling lane. When these procedures were completed, the clean and dirty man were ready to enter the sampling lane and carry out the visual site survey.

Canada's sampling lane was a wooded area approximately 10 meters wide and 50 meters deep. The fact that the site was wooded required changing how the sampling team carried out the visual site survey. Previously, the sampling team had proceeded to the farthest point downwind and had worked their way back to the liquid/vapour hazard area. The presence of low overhanging tree branches, which could be contaminated with chemical warfare agents meant that the team risked contaminating themselves if they carried out the site survey in the normal manner. The procedure was therefore changed such that the sampling team started at the farthest point upwind and using the CAM to check for CW agents worked their way downwind. This approach worked well and should be considered for future site surveys.

During the visual site survey, one site was marked as a potential sampling location. This site, at almost the farthest downwind point on the sampling lane, contained a portion of a respirator, a filter cartridge and a container of liquid. The dirty man carrying the H mode CAM checked for the presence of mustard. No response was obtained from any of the materials at this location. When switched to G mode, the CAM was overloaded and was slow to clear down (eventually this CAM had to be replaced with a spare kept at the clean/dirty line). The initial CAM survey, in G mode, provided a 4 bar response in the proximity of the respirator. This positive CW indication was immediately radioed to the decon man, who setup the NATO standard warning sign indicating the presence of contamination. The decon man also prepared the NBC-4 message for transmission to higher command.

Once the visual site survey was completed, the sampling team, returned to the edge of the liquid/vapour hazard area. Here they collected the sampling kits and accompanied by the recorder, returned to the sampling site. A second survey of selected items at the sampling site was carried using 3-way detector paper. A faint yellow colour, indicating the presence of a nerve agent, was observed from a sample collected from the face piece of the respirator.

A liquid sample was collected from the container at the sampling location. The liquid did not wet the detector paper, indicating that it was aqueous rather than organic. No indication of CW agents was obtained with 3-way detector paper. A soil sample was collected from near the filter cartridge and a vapour sample was collected from above the liquid container. Finally the filter cartridge and respirator were separately wrapped in tin foil and placed in individual bags.

Following sample collection, the decon man was advised by radio that sampling was completed and the team was heading to the clean/dirty line. It had been the intention to decontaminate the sampling team members and their equipment using the procedures described in the "Phase 4 Exiting the Contaminated Site" section of this report. However, prior to the sampling demonstrations, Poland had requested and the countries had agreed to a change in their decon procedures. For Canada, this meant the team and their equipment was decontaminated, then still in TOPP HIGH, they proceeded to the Polish decon line where they were checked with real time CW agent monitors. If no contamination was found they could proceed to a clean area and remove their protective clothing. If contamination was found the sampling team would undergo a further decontamination at the Polish decon line. No contamination was found on the Canadian sampling team and they proceeded directly through the decon line. This concluded the first sampling demonstration.

The changes in the decontamination procedures meant that the packaging of the samples which normally would have occurred immediately after the team had decontaminated and undressed was delayed until the team had returned to their tent. At that time, they demonstrated to the umpires, the packaging and transport procedures and equipment available to the team.

CW SAMPLING DEMONSTRATION #2

On the morning of September 3rd, 1998, the SICA sampling teams from Poland and the participating NATO countries again assembled at MU 2130 and were given an operational briefing. The main difference from the previous day's briefing was that for this trial, the chemical warfare agent mustard had been used to contaminate the sampling layout.

The sampling layout was the same as that used for sampling demonstration #1 and is illustrated in Figure 1. Prior to proceeding to the trial layout, umpires were assigned to each team (two from DE were assigned to the CA team). The Canadian team then proceeded to carry out the tasks as described in the Phase 1 Pre-deployment checklist. Normally, at this point the CA sampling team would move to TOPP MEDIUM and would carry the transport containers to a clean area upwind of the contaminated site, where they would establish the liquid/vapour hazard area. In Poland, prior to entering the sampling layout, each team was required to be in TOPP HIGH and undergo a gas mask check using a testing facility provided by Poland. For this reason, before the start of the demonstration each team was allowed "administrative time" during which they could pre-deploy their equipment.

The CA sampling team and their umpires proceeded to the gas mask check area and once cleared by the Polish safety personnel, moved to their lane on the sampling layout. Each team member then initiated the procedures outlined in the "Arrival On Site" checklist. As the final step in this phase of the mission, the decon man then established the clean/dirty line. The team then collected representative soil, vapour and water control samples before proceeding into the contaminated area. When these procedures were completed, the clean and dirty men were ready to enter the sampling site and carry out the visual site survey.

During the visual site survey, one site was marked as a potential sampling location. This site, at almost the farthest downwind point on the sampling lane contained a portion of a respirator, a filter cartridge and a container of liquid. The initial CAM survey, in H mode, provided a 8 bar response in the proximity of the respirator. This positive CW indication was immediately radioed to the decon man, who setup the NATO standard warning sign indicating the presence of contamination. The decon man also prepared the NBC-4 message for transmission to higher command.

The sampling team, once the visual site survey was completed, returned to the edge of the liquid/vapour hazard area. Here they collected the sampling kits and accompanied by the recorder, returned to the sampling site. A liquid sample was collected from the container at the sampling location. The liquid partially wet the 3-way detector paper and after a few minutes a small amount of red colouration was observed indicating the presence of a vesicant. Figure 3 illustrates the collection of a vapour sample above the liquid container. The respirator and filter cartridge can be observed in the background and foreground respectively.

Figure 3. Collection of vapour sample using hand held pump and solid adsorbent sampling tube. Respirator is visible in background and filter cartridge can be seen in foreground.

CAM responses in H mode were recorded from many of the areas around the respirator and filter cartridge. A soil sample was collected from near the filter cartridge. Finally, the filter cartridge and respirator were separately wrapped in tin foil and placed in individual bags. Figure 4 illustrates the respirator being wrapped in tin foil prior to being bagged. During sample collection, the outer glove of the dirty man became visibly wetted a with liquid. The source of the liquid was unclear, therefore it was decided to remove the contaminated glove and replace it with a clean glove (spare gloves are carried by each team member).

Figure 4. Collection of respirator from sampling location. Respirator is wrapped in tin foil prior to being bagged.

Following sample collection, the decon man was contacted by radio and informed that sampling was completed and the team was heading to the clean/dirty line. Rather than undergoing the complete decon procedures according to the CA SOP's, the team proceeded as in the previous demonstration by decontaminating themselves and their equipment, then proceeding, still in TOPP HIGH, to the Polish decon line where they were checked with real time CW agent monitors. No contamination was found on the Canadian sampling team and they proceeded directly through the decon line and removed their protective clothing. This concluded the second sampling demonstration. It should be noted that the samples were left at the sampling site and later destroyed by the Polish safety personnel.

As in the previous demonstration, the packaging of the samples, which normally would have occurred immediately after the team had decontaminated and undressed was not carried out. Instead, the packaging and transport procedures were demonstrated to the umpires.

UMPIRES DEBRIEFINGS

Following each of the SICA CW agent sampling demonstrations the umpires, using the checklists found in Annex II, debriefed their assigned sampling teams. The umpires who evaluated the Canadian team (UK and PO for demonstration #1 and DE for demonstration #2) started their debriefings by making some general comments. The umpires felt that the use of checklists was a good idea as they clearly identified each team members' responsibilities. They felt that there was good discussion between the team members and that this led to each team member checking themselves and each other. The UK pointed out that the benefit of this communication became clear during the sampling of the respirator. The sampling team, using the CAM, had determined that the respirator was likely contaminated, but could not isolate which part of the respirator was contaminated. Rather than cut the respirator into a number of pieces, the clean and dirty man decided that the prudent choice was to collect the entire respirator as a sample.

The umpires then went through the checklist found in ANNEX II and indicated where the Canadian team was in compliance with AEP-10. Where the umpires felt the Canadian team was not in compliance with AEP-10, they sought clarification of the issue with the team members. Comments in **bold** are those of the authors.

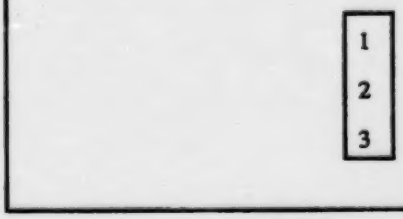
Using the Protection/Contamination Control checklist the umpires indicated that the Canadian team was in compliance with all items on the checklist. Using the Sampling checklist for a Unit Military Team, the umpires indicated that, the Canadian team was in compliance with most of the approximately 65 items on the checklist. Where the Canadian team did deviate from AEP-10, most dealt with the means for storing samples (air, water, soil and material) in order to avoid decomposition during transport. In AEP-10, it is indicated that cooling the samples during transport may minimize the decomposition of chemical warfare agents. **The Canadian equipment does not provide for the cooling of samples during transport. Canada feels that the requirement for refrigeration is overstated in AEP-10 and believes the SIBCA subgroup should evaluate the scientific requirement for cooling samples. If the evaluation does not support this requirement, then it should be removed from AEP-10 and its implementation left to the discretion of individual nations.**

Item 4.2 checks that amount of water sample taken is in the order of 50-100mL. The Canadian sample bottle can hold up to 20 ml of a water sample. Item 5.1 checks that the amount of soil taken is approximately 200 ml. The Canadian sample bottle can hold up to 20 ml of a soil sample. **Canada believes that the requirement for sample containers with a volume of 200 ml as described in AEP-10, should be reviewed by the SIBCA subgroup. While Canada feels that 20 ml of soil or water is sufficient for analysis purposes, it recognizes that other NATO countries may have other requirements. For instance, in place of replicate samples, it may be desirable to collect larger samples for subsequent sub-division at the laboratory.**

Using the Reporting checklist the umpires indicated that the Canadian team was in compliance with all items on the checklist. The umpires did comment on the Canadian use of a notebook to record information in the contaminated area and then copying this information to the sample data sheets during packaging of the samples for transport. They felt that this might lead to transcription errors. **Canada agrees that the possibility of transcription errors does exist, however, the use of a notebook while collecting samples allows more detailed information to be recorded (e.g. time of sampling, sketches of layout, etc.) than could be recorded on the sample data sheets. One of the recommendations from this demonstration is that along with the sample data sheets, the notebook should be packaged with the samples and sent to the laboratory as accompanying documentation. Figure 5 illustrates two pages out of the Canadian notebook used during the second CW agent sampling demonstration. The pages contain information on the sampling location (sketch and GPS) as well as a description of the types of samples collected and a chronological record of the sampling mission.**

Sample #	Sample Type	CAM	3Way Paper	Time	Rmks
006	Water	ND	ND	0926	Control
001	Soil	ND	ND	0927	Control
017	Air	ND	ND	0929	Control 15 pumps
007	Liq	8 Bar	Pos H	0927	Posn 2
008	Soil	8 Bar	ND	0951	Photo 6
016	Air	8 Bar	ND	0953	Posn 2
020	Solid	8 Bar	ND	0956	Posn 3
021	Solid	8 Bar	ND	0959	Posn 1

Site Map



Posn 1 Respirator Piece

Posn 2 Liquid Container

Posn 3 Respirator Filter

Date 030998	Position: 34U 0516734 UTM 5790476
Time	Comment
0915	Prepared Site (Photo #1)
0924	Entered Site
0925	Control Samples (Photo #2)
0931	Site Survey
0935	Located Contamination
0937	Completed Survey Sent NBC 4 Message
1001	Completed Sampling (Photo #10)
1003	Proceeded to Decon

Figure 5. Representative pages from CA notebook used on CW agent sampling demonstration #2.

CANADIAN RECOMMENDATIONS

These CW agent sampling demonstrations were extremely valuable, not only from a scientific viewpoint, but also for raising the profile of SICA within the military. The sampling demonstrations afforded the NATO countries an opportunity to implement the lessons learned (i.e. team size, contamination control, chain of custody, etc) from the successful field trials held in France in 1997. Within the NATO context, the major issue identified as a result of the field trials in France and the sampling demonstrations in Poland are the questions of legality and continuity of evidence.

Chapter 1 of Edition 4 of AEP-10, states that "the prime reason for the rapid identification of chemical warfare agents in a battlefield environment is to confirm enemy use and to support timely decisions concerning the NATO response to such actions." Agent identification is also a tactical requirement by the commander in the field. Information about the nature of the weapon he is facing including its effects and persistency may have considerable operational impact. Medical services will require the information in order to provide the most appropriate treatment and effective counter-measure. There will also be a certain psychological benefit in knowing the nature of the hazard, which will assist in dispelling fears of the unknown and instill confidence in equipment and training. On a wider timescale agent identification provides information upon which future threat assessment can be made and guidance gained for the future design of defensive equipment and procedures.

Ultimately, NATO must decide if there is a requirement for the results of the SICA process to be used as evidence within the international legal system. In such a case, the sampling and identification process would have to be able to stand up under legal examination.The need to collect legally defensible evidence would have a dramatic impact not only on how samples are collected, but also on who would be responsible for sample collection and analysis. Alternatively, if this information is required solely for the use of the military, then the requirement for burden of proof may be somewhat less rigorous. In such a case, it is expected that the samples would collected by troops trained in sampling techniques, the samples packaged according to national regulations and the samples accompanied by an escort with the a controlled chain of custody. Once received at the

laboratory, the handling and analysis of the samples would be conducted in a manner to maintain the chain of custody and in accordance with AEP-10. The authors recommend that the SIBCA subgroup seek the guidance of LG/7 and SHAPE in determining the military requirements in the this area.

On the operational and scientific side, the cooling of samples for transport and the amount of sample collected are two issues that need to be addressed. Although their position is not universally supported by the other NATO countries, the authors believe that, as described in AEP-10, these two issues constitute a significant logistics burden on operational troops. The need for refrigerated transport containers with their associated power requirements as well as the need for large amounts of sample (~200ml) increases the problems for the sampling teams who are already working in full NBC protective clothing under dangerous conditions. Scientifically, while the cooling of samples and collection of large amounts of sample can be justified on a theoretical basis, the authors believe that, on a practical basis, it may be possible to reduce or eliminate these requirements and feel that the SIBCA subgroup should evaluate the scientific requirement for cooling samples. If the evaluation does not support this requirement, then its implementation should be left to the discretion of individual nations. In addition, the requirement for sample containers with a volume of 200 ml should be reviewed by the SIBCA subgroup. While the authors feel that 20 ml of soil or water is sufficient for analysis purposes, it recognizes that other NATO countries may have other requirements.

As a result of the field trials in France in 1997 and the CW agent sampling demonstrations in Poland in 1998, there are a number of issues that Canada must address internally. The first issue is that of the mandate of SIBCA and how this process can be implemented within the Canadian Forces. There is a requirement for the CF to formulate a Concept of Use document that describes the overall framework within which SIBCA as well as radiological sampling and identification (SIBCRA) can be developed within the Canadian Forces. Secondly, a decision will have to be made on whether Canada will train a single sampling team or teach sampling procedures to the Canadian Forces as part of their NBC training. It would appear from the specialist nature of the sampling and identification process that it would be best to train a single team, most likely composed of instructors from the NBC

School and augmented with other specialists as required. Once these decisions are made, it would then be incumbent on DRES to support the team by developing specialist training and equipment along with providing the national capability for the identification of the CB agents.

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11. Transportation of Dangerous Goods by Canadian Forces Aircraft, A-LM-117-001/FP-001, Chief of Defence Staff, Canada, 1 December 1996.
12. NATO Standardization Agreement No.3854, Policies and Procedures Governing the Transportation of Dangerous Cargo, Edition 2, 15 February 1988.

ANNEX I

CONTENTS OF TRANSPORT CONTAINERS

Transport Container #1 (Sampling Kits and GPS)

Chemical Agent Sampling Kit Vapour And Solid Sampling Module
- One Drager Hand Pump
- Six Tenax Filled Air Sampling Tubes
- Six TDS3 Air Sampling Tube Transport Containers
- Twelve Metal Scoopulas
- Five 20 ml Glass Sample Vials
- Six Sheets Aluminum Foil
- Two Large Polyethylene Bags
- Four Medium Polyethylene Bags
- Four Small Polyethylene Bags
- One Package Cotton Tipped Swabs
- One 20 ml Vial Of Dichloromethane
- One Pair Of Tongs
- One Notebook
- Two Markers
- One Ball-point Pen
- Two Lead Pencils
- Twenty Adhesive Labels
- One Ammo Pouch
- One External Mounted Ground Sheet

Chemical Agent Sampling Kit Liquid Module.
- Two Pipette Pumps
- Six 10 ml Disposable Pipettes
- Four 5 ml Disposable Syringes
- One 50 ml Disposable Syringe
- Four Syringe Adapters
- Six 20 ml Glass Sample Vials
- Two Packages Of 3-Way Detector Paper
- Four Sections Of 1/8" Narrow Bore Teflon Tubing
- Three Feet ¼" Tygon Tubing
- One Pair Of Scissors
- One Pair Of Gloves
- Four Pair Of Plastic Tweezers

Four Bundles Of 5 Each Yellow Maker Flags
One Roll Of Surveyors Tape
Ten Metal Pikes
One Pair Of Scissors
One Global Positioning System (GPS) And Manual
One Package Of AA Batteries For GPS

One Compass
Two Lead Pencils
One Package Of Hazard Symbols
Three Hazard Symbols Posts
Five Radios
Two Electrical Power Bars
One Electrical Transformer
Five Radio Chargers
Two 20 ml Vials Of Dichloromethane

Transport Container #2 (Chemical Agent Monitors)

Four Chemical Agent Monitors
Leak Test Certificate
Radioactive License
Four Confidence Testers
Four CAM Carrying Cases
Two Spare Nozzle Caps
One Box of 16 CAM Batteries
Four CAM Buzzers
Four 9Volt Batteries

Transport Container #3 (Decontamination Kit)

20 Liter Jerry Can
Two Metal Trays (Approx. 24x" 13"x4")
Two Metal Trays (Approx. 8"x 8"x3.5")
Pump Assembly
Adapter Assembly
Extension Wand
Solid Black Spray Hose
Spray Nozzle
Spare Parts Kit
Tool Kit
Sponges
2 X 1 kg Powder Bleach Bottles
Four HI-6 Autoinjectors
Four Diazepam Autoinjectors
Ten NAVD Tickets
Ten Packages 3-Way Detector Paper
Six RSDL Towels

Transport Container #4 (Packaging Kit)

Four Class 6 Division 6.1 Pg I IATA Approved Containers.
One Roll Of Security Tape
One Roll Of Fiberglass Tape
One Roll Of Gun Tape
One Clipboard
One Pad Of Sample Data Sheets
Two Lead Pencils
Four Respirators
Two Pair Of Scissors
One Bag Of Latex Gloves
ATP-45 Booklet
ATP-45 Message Forms
One Notebook
Two Disposable Cameras

Transport Container #5 (Spares Kit)

Chemical Agent Sampling Kit Vapour Module (Detailed Inventory List Given In Transport Container #1 Above).
Chemical Agent Sampling Kit Liquid And Solid Module (Detailed Inventory List Given In Transport Container #1 Above).
Three Bundles Of 5 Each Yellow Maker Flags.
One Rolls Of Surveyors Tape.
Four Ground Sheets.
Four Metal Spikes.
One Pad Of Sample Data Sheets.
One Bag Cable Ties.
One Envelope Spare Labels
Two Hazard Symbol Holders.
One Pair Of Scissors.
One Pad NBC Messages
One Notebook
One ATP-45 Booklet
Four 9V Batteries
Five Pencils
One Ammo Pouch
Four Respirators
Nine RCMP Evidence Bags
One Envelope Spare Transport Container Labels
One Envelope Spare Transport Container Contents Labels

Transport Container #6 (Military Clothing)

Five Pairs NBC Overboots
One Pair Combat Boots
Four Canteens With Drinking Attachment
Four C7 Respirator Canisters

Transport Container #7 (Military Clothing)

Eleven Pairs Latex Gloves
Four Pairs Nbc Gloves
Sixteen Pairs Lightweight NBC Gloves
Two Tall/Medium CB Suits
Two Regular/Medium CB Suits

Transport Container #8 (Military Clothing)

Five Mask Carriers
Four Tall/ Medium CB Suits

ANNEX II

PROTECTION/CONTAMINATION CONTROL CHECKLIST FOR A UNIT MILITARY TEAM

Reference: STANAG 2150, STANAG 2352, and STANAG 2429

ITEM	CHARACTERISTICS	OP*	COMMENTS
1	**Protection**		
1.1	Is each member of the Sampling Team Equipped with Mask, Canister, and IPE to include gloves and boots IAW STANAG 2352		
1.2	Is each member of the Sampling Team individually identified IAW STANAG 2429		
1.3	Is each member of the Sampling Team equipped with individual decontamination kits and individual medical countermeasures IAW STANAG 2352		
1.4	Does each member of the Sampling Team have his individual protective equipment properly donned and fitted IAW STANAG 2150		
2	**Contamination Control**		
2.1	Are collected samples placed just near the contaminated side of the hot line.		
2.2	Do sampling team members properly decontaminate using available equipment (Hands and Feet) IAW STANAG 2150		
2.3	If a positive detection of contamination on the samples by the French Contamination Control Team is experienced does the SICA team correctly decontaminate the samples.		
2.4	If a positive detection of contamination on the sampling team members IPE by the French Contamination Control Team is experienced does the SICA team correctly perform undressing procedures IAW STANAG 2150.		

Additional comments:

OP: operational/in compliance
*: fulfillment with comments

+: fulfillment
-: no fulfillment

SAMPLING CHECKLIST FOR A UNIT MILITARY TEAM

Reference: AEP-10 Handbook, Edition 4, Chapter 2

ITEM	CHARACTERISTICS	OP*	COMMENTS
1.1	Is the minimum size of the unit military team two persons		
1.2	Is adequate detection equipment available and if yes is it based on a physical principle (e.g. IMS) or on wet chemistry		
1.3	Is equipment available for the recording of factual information (photocamera's etc.)		
2	**Sampling equipment**		
2.1	Is the contents of the sampling kit adequate to take at least 10 samples of all necessary types (air, soil, water, materials)		
2.2	Are primary sample containers made of Teflon, glass or plasticiser-free plastic material		
2.3	Are primary sample containers provided with adequate closures		
2.4	Is a variety of sample taking devices (e.g. spatulas, scoops) present		
2.5	Are sample taking devices (e.g. spatulas) disposable and/or individually sealed		
2.6	Are markers and pens present and do they provide a clear and waterproof writing		
2.7	Are sample documentation forms present and do they contain sufficient items to register all details of the sampling process		
2.8	Are sample chain-of-custody forms present		
2.9	Are sample labels and seals present		
	Are non-breakable secondary containers and charcoal present for packaging and transport of samples		
2.11	Are decontamination means present for decontaminating the outside of sample containers, if necessary		
2.12	Does the sampling equipment provide for preserve samples (e.g. cooling)		

OP: operational/in compliance +: fulfillment
*: fulfillment with comments -: no fulfillment

SAMPLING CHECKLIST FOR A UNIT MILITARY TEAM

Reference: AEP-10 Handbook, Edition 4, Chapter 2

ITEM	CHARACTERISTICS	OP*	COMMENTS
3	**Air samples**		
3.1	Are air samples taken after an indication of the detection equipment		
3.2	Are samples taken downwind of the source		
3.3	Are vapour samples collected on adsorption tubes (Tenax or Chromosorb 106)		
3.4	Are aerosol samples (smoke) collected on aerosol filters		
3.5	Is the amount of the samples taken relevant (ca. 1 litre)		
3.6	Are control samples taken		
3.7	Are the primary sample containers closed correctly		
3.8	Are documentation forms filled-in		
3.9	Are samples labelled and sealed		
3.10	Are samples packed correctly (no contamination on the outside, not packed together with a liquid etc.)		
3.11	Are samples packed in such a way that they are ready for transport to a laboratory		
3.12	Are under the given circumstances the samples stored in such a way that decomposition is avoided		
4	**Water samples**		
4.1	Is the number of the samples taken relevant to the contaminated area		
4.2	Is the amount of the samples taken relevant (in the order of 50-100 ml)		
4.3	Are samples taken with clean collection instruments (pipettes, vacutainer tubes etc.)		
4.4	Are samples taken at the right depth (surface and 25 cm, if relevant)		
4.5	Are samples stored in clean containers (bottles etc.)		

4.6	Is the size of the container not to large in relation to the amount of the sample
4.7	Are samples taken using solid phase extraction (SPE) tubes and if yes is the water pressed through the tubes collected as well

OP: operational/in compliance +: fulfillment
*: fulfillment with comments -: no fulfillment

SAMPLING CHECKLIST FOR A UNIT MILITARY TEAM

Reference: AEP-10 Handbook, Edition 4, Chapter 2

ITEM	CHARACTERISTICS	OP*	COMMENTS
4.8	Are control samples taken		
4.9	Are the primary sample containers closed correctly		
4.10	Are documentation forms filled-in		
4.11	Are samples labelled and sealed		
4.12	Are samples correctly packed (no contamination on the outside of the container, size by size etc.)		
4.13	Are samples packed in such a way that they are ready for transport to a laboratory		
4.14	Are under the given circumstances the samples stored in such a way that decomposition is avoided		
5	**Soil samples**		
5.1	Is the amount of the samples taken relevant (cat 200 ml)		
5.2	Is the numbs of the samples taken relevant to the contaminated area		
5.3	Are samples taken at the right location (e.g. depth of 2 cm)		
5.4	Are samples taken with clean collection instruments (spatulas, scoops etc.)		
5.5	Are samples stored in clean containers (vials bags etc.)		
5.6	Are control samples taken		

5.7	Are the primary sample containers closed correctly
5.8	Are documentation forms filled-in
5.9	Are samples labelled and sealed
5.10	Are samples correctly packed (no contamination on the outside of the container, size by size etc.)
5.1 1	Are samples packed so that they are ready for transport to a laboratory
5.12	Are under the given circumstances the samples stored in such a way that decomposition is avoided

OP: operational/in compliance +: fulfillment
*: fulfillment with comments -: no fulfillment

SAMPLING CHECKLIST FOR A UNIT MILITARY TEAM

Reference: AEP-10 Handbook, Edition 2

ITEM	CHARACTERISTICS	OP*	COMMENTS
6	**Material samples**		
6.1	Is the amount of the sample taken relevant		
6.2	Is the number of the samples taken relevant to the contaminated objects		
6.3	Are samples taken with clean collection instruments knifes scissors etc.)		
6.4	Are samples taken by swabbing and if yes is each time a clean swab used		
6.5	Are samples stored in clean containers (vials, bags etc.)		
6.6	Are control samples taken, if possible		
6.7	Are the primary sample containers closed correctly		
6.8	Are documentation forms filled-in		
6.9	Are samples labelled and sealed		
6.10	Are samples correctly packed (no contamination on the outside of the container, size by size etc.)		
6.11	Are samples packed so that they are ready for transport to a laboratory		

6.12	Are under the given circumstances the samples stored in such a way that decomposition is avoided	

Additional comments:

OP: operational/in compliance +: fulfillment
*: fulfillment with comments -: no fulfillment

REPORTING CHECKLIST UNIT MILITARY TEAM
Reference: AEP-10 Handbook, Edition 4, Chapter 6 and ATP-45(A)

ITEM	CHARACTERISTICS	OP*	COMMENTS
1	**General**		
1.1	Is the Sampling Team aware of the appropriate communications chain of command		
1.2	Is the Sampling Team Aware of appropriate ATP-45(A) procedures		
1.3	Is appropriate communications equipment available		
1.4	Are appropriate message formats for reporting available		
2	**Reporting**		
2.1	Are correctly formatted NBC4 reports prepared for each sample taken		
2.2	Is SICA identified in Line QUEBEC of the NBC-4 report		
2.3	Is other pertinent sampling information entered in Line ZULU BRAVO of the NBC-4 Report		
2.4	Are the NBC-4 reports dispatched in a timely manner		

Additional comments:

OP: operational/in compliance +: fulfillment
*: fulfillment with comments -: no fulfilment

DOCUMENT CONTROL DATA

(Security classification of title, body of abstract and indexing annotation must be entered when the overall document is classified)

1. ORIGINATOR (the name and address of the organization preparing the document. Organizations for whom the document was prepared, e.g. Establishment sponsoring a contractor's report, or tasking agency, are entered in section 8.)

Defence Research Establishment Suffield
Box 4000, Stn Main, Medicine Hat, AB T1A 8K6

2. SECURITY CLASSIFICATION (overall security classification of the document, including special warning terms if applicable)

Unclassified

3. TITLE (the complete document title as indicated on the title page. Its classification should be indicated by the appropriate abbreviation (S,C,R or U) in parentheses after the title.)

Canadian Participation in the 1998 NATO/Poland Chemical Warfare Agent Sampling Demonstration

4. AUTHORS (Last name, first name, middle initial. If military, show rank, e.g. Doe, Maj. John E.)

Hancock, James R., Tremblay, Capt, Roger, A., Marshall, Sgt, Donald, and Nadeau, LCdr, Jean-Guy

5. DATE OF PUBLICATION (month and year of publication of document)	6a. NO. OF PAGES (total containing information. Include Annexes, Appendices, etc.)	6b. NO. OF REFS (total cited in document)
April 1999	24	12

6. DESCRIPTIVE NOTES (the category of the document, e.g. technical report, technical note or memorandum. If appropriate, enter the type of report, e.g. interim, progress, summary, annual or final. Give the inclusive dates when a specific reporting period is covered.)

DRES Technical Report 1999-050

8. SPONSORING ACTIVITY (the name of the department project office or laboratory sponsoring the research and development. Include the address.)

9a. PROJECT OR GRANT NO. (if appropriate, the applicable research and development project or grant number under which the document was written. Please specify whether project or grant)	9b. CONTRACT NO. (if appropriate, the applicable number under which the document was written)
6QD16	

10a. ORIGINATOR'S DOCUMENT NUMBER (the official document number by which the document is identified by the originating activity. This number must be unique to this document.)	10b. OTHER DOCUMENT NOS. (Any other numbers which may be assigned this document either by the originator or by the sponsor)
DRES TR 1999-050	

11. DOCUMENT AVAILABILITY (any limitations on further dissemination of the document, other than those imposed by security classification)

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Between 1-3 September 1998, Canada participated in two NATO Sampling and Identification of Chemical Agents (SICA) demonstrations conducted at the Military Unit 2130, Warsaw, Poland. SICA teams from 9 NATO countries (BE, CA, FR, IT, NL, NO, SP, UK and US) as well as a team from Poland participated in the demonstrations. The first demonstration was conducted using a chemical warfare (CW) simulant, while the second demonstration was conducted with the CW agent, mustard.

The CW agent sampling demonstrations were valuable, not only from a scientific viewpoint, but also for raising the profile of SICA within the military. The sampling demonstrations afforded the NATO countries an opportunity to implement the lessons learned (i.e., team size, contamination control, chain of custody, etc.) from the successful field trials held in France in 1997.

Within the NATO context, the major issue arising from the sampling demonstrations was the collection of samples as legal evidence. The prime reason for the sampling and identification of biological and chemical agents is to confirm use by the enemy and thereby support timely decisions concerning the NATO response to such actions. Subsequently, NATO may decide to turn the evidence of a CB attack over to the legal system. In such cases, the sampling and identification process must be able to stand up under legal examination. Alternatively, if this information is required solely for the use of the military, then the requirements may be somewhat less rigorous. The authors recommend that the Sampling and Identification of Biological and Chemical agents (SIBCA) subgroup seek the guidance of LG/7 and SHAPE in determining the military requirements in this area.

Canada needs to address how the SIBCA process can be implemented with the Canadian Forces (CF). The CF needs to formulate a Concept of Use document that describes the overall framework within which SIBCA, and ultimately radiological sampling and identification (SIBCRA), can be developed within the Canadian Forces.

14. KEYWORDS, DESCRIPTORS or IDENTIFIERS (technically meaningful terms or short phrases that characterize a document and could be helpful in cataloguing the document. They should be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location may also be included. If possible keywords should be selected from a published thesaurus. e.g. Thesaurus of Engineering and Scientific Terms (TEST) and that thesaurus-identified. If it is not possible to select indexing terms which are Unclassified, the classification of each should be indicated as with the title.)

NATO

SICA

SIBCA

Chemical Warfare Agents

Sampling